

NON-PUBLIC?: N
ACCESSION #: 9108010174
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Seabrook Station PAGE: 1 OF 4

DOCKET NUMBER: 05000443

TITLE: Turbine Trip with Reactor Trip Due to an Inadvertent Actuation of
Switchyard Circuit Breakers
EVENT DATE: 06/27/91 LER #: 91-008-00 REPORT DATE: 07/26/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Allen L. Legendre, Lead Engineer - TELEPHONE: (603) 474-9521
Compliance, Extension 2373

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On June 27, 1991, at 1:34 p.m., a turbine generator trip with a subsequent reactor trip occurred while the plant was at 100% power. The turbine trip was initiated when two switchyard 345kV circuit breakers tripped open disconnecting the generator from the offsite distribution system.

The event occurred during the performance of a preventive maintenance activity on a breaker failure relay 50BF-2/11(H)! for 345kV circuit breaker 11. As the relay was being returned to service (closure of two knife blade switches), momentary arcing occurred across the contacts. The arcing caused a high speed tripping auxiliary relay to pick up without picking up an associated lock out relay. This partial relay actuation resulted in 345kV circuit breakers 11 and 163 opening without generating a signal to open the Unit Auxiliary Transformer (UAT) supply

breakers to unit busses 1 through 6. Because of this, the automatic transfer to the Reserve Auxiliary Transformers (RAT) was prevented, resulting in the automatic starting of both emergency diesel generators. Offsite power remained available to the RATs at all times. A turbine trip occurred within one second of the opening of the 345kV circuit breakers. The turbine trip initiated a reactor trip. Following the reactor trip, natural circulation was established. A Main Feedwater Isolation and subsequent Emergency Feedwater Actuation also occurred. Additionally, a Containment Ventilation Isolation and an actuation of the Control Room Emergency Air Cleanup and Filtration System occurred due to the momentary deenergization of the Emergency Busses.

The root cause has been determined to be a manufacturing error in the relay housing contact block assembly for the breaker failure relay. This breaker failure relay was caution tagged to preclude any further maintenance until it is replaced during the first refueling outage. Other relays similar in design will be inspected to ensure that the correct switch assemblies are installed. In addition, the automatic transfer scheme from the UATs to the RATs and the tripping scheme for the out of step relay will be reevaluated.

END OF ABSTRACT

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On June 27, 1991, at 1:34 p.m., EDT, a turbine generator trip with a subsequent reactor trip occurred while the plant was at 100% reactor power. The turbine trip was initiated when two switchyard 345kV circuit breakers (11 and 163) tripped open disconnecting the generator from the offsite distribution system.

Description of Event

Prior to the event, the plant was at 100% power, with plant systems in a steady state condition. The event occurred during the performance of a preventive maintenance activity on a breaker failure relay 50BF-2/11(H) for 345kV circuit breaker 11. When the two knife blade switches were closed to restore the relay to service, a momentary arcing occurred across the contacts. This caused a high speed tripping auxiliary relay (94-78/B3), part of the 78/B3 out of step relay, to actuate without, actuating an associated lock out relay (86-78/B3). This partial relay actuation resulted in the opening of 345kV circuit breakers 11 and 163 without generating a relay signal to open the Unit Auxiliary Transformer (UAT) supply breakers to unit busses 1 through 6. As a result of the UAT breaker not opening, the automatic transfer to the Reserve Auxiliary

Transformers (RAT) was prevented, resulting in both emergency diesel generators starting automatically and energizing 4kV vital busses E5 and E6. It is important to note however, that offsite power remained available to the RATs at all times during the transient. Power was manually transferred to the RATs once operators ensured that the plant was in a stable condition.

The sudden loss of turbine load caused the early valve actuation (EVA) and the power load unbalance (PLU) protective features to actuate the rapid closure of the turbine control valves and intercept valves. A turbine trip occurred within one second of the opening of the 345kV circuit breakers. The rapid closure of the turbine control valves created pressure pulses which resulted in a Main Feedwater Isolation. These pressure pulses were transmitted through the steam now transmitters water filled lines and sensed by the high pressure side of the steam generator narrow range level transmitter. This resulted in the steam generator high-high signal and subsequent feedwater isolation. Actual steam generator levels did not approach the high-high level setpoint (P-14) at any time. Due to the loss of feedwater to a steam generator, an Emergency Feedwater Actuation occurred as designed.

The turbine trip initiated a reactor trip, Natural circulation was established in the Reactor Coolant System (RCS) as expected. Due to the loss of power, condenser steam dumps were not available, except for a brief period (approximately one second) following the trip. The atmospheric steam dump valves in each of the four main steam headers opened to control steam pressure during the event. Plant buses were re-energized from the offsite power sources beginning at 1:54 p.m. EDT with all busses being reconnected by 2:20 p.m. EDT.

In addition, when 345kV circuit breakers 11 and 163 opened, vital instrument bus 1E momentarily deenergized resulting in a Train "A" Containment Ventilation Isolation and an actuation of the Control Room Emergency Air Cleanup and Filtration System.

Safety Consequences

There were no adverse safety consequences as a result of this event. Offsite power remained available to the RATs at all times during the transient. All the applicable trips and interlocks associated with the reactor trip functioned as designed. In addition, the emergency diesel

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generators reached their rated speeds and voltage, and sequentially energized their respective loads as required.

All operator actions were determined to be appropriate to ensure the safety of the plant. At no time during this event was there any impact on the health and safety of plant employees or the public.

Root Cause

The root cause has been determined to be a manufacturing error in the relay housing contact block assembly on the 345kV breaker 11 breaker failure protection relay. The contact block is designed to have a make-before-break feature which allows the relay to be removed from service while other relay protection circuits remain in service. The contact assembly is comprised of a bank of knife blade style switches in the relay housing. The knife blade switches are in pairs with one of the paired switches being configured to make-before-break while the other is configured as a break-before-make switch. This configuration allows the device to be removed from a current transformer circuit without interrupting the circuit. Post-trip troubleshooting revealed that one of the pairs of knife blade switches was incorrectly assembled with two break-before-make switches.

Corrective Action

After the trip, the plant was placed in HOT STANDBY in accordance with operating procedure OS1000.11, "Post Trip to Hot Standby". An event evaluation and post trip review were immediately initiated. A Human Performance Enhancement System (HPES) analysis as well as a root cause analysis were also initiated.

The subject relay, 50BF-2/11(H), was caution tagged to preclude any further maintenance while the unit is operating at power. The out of step relay (78/B3) was tagged out of service until a thorough test is performed. Additional corrective actions include the following:

- 1) The relay housing for relay 50BF-2/11(H) will be replaced during the first refueling outage.
- 2) Other relay assemblies similar in design to relay 50BF-2/11(H) will be inspected to ensure that the correct switch assemblies are installed. These inspections will be performed before further preventative maintenance activities are conducted on the relays. These inspections are currently scheduled to be completed by December 31, 1991.
- 3) The tripping scheme for the out of step relay (78/B3) and the automatic transfer scheme from the UATs to the RATs will be

reevaluated. This evaluation is currently scheduled to be completed by December 31, 1991.

4) An evaluation will be conducted to determine the cause for the momentary deenergization of the vital instrument bus 1E. This evaluation is currently scheduled to be completed during the first refueling outage.

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Plant Conditions

At the time of this event, the plant was in Mode 1, Power Operation at 100%, with an RCS temperature of 587 degrees Fahrenheit and pressure of 2,235 psig.

This is the first event of this type at Seabrook Station.

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New Hampshire Ted C. Feigenbaum
Yankee President and
Chief Executive Officer

NYN-91118

July 26, 1991

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: Licensee Event Report (LER) No. 91-008-00: Turbine Trip
with Reactor Trip Due to an Inadvertent Actuation of
Switchyard Circuit Breakers

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 91-008-00 for Seabrook Station. This submittal documents an event which occurred on June 27, 1991, and is being reported pursuant to 10CFR50.73(a)(2)(iv),

Should you require further information regarding this matter, please

contact Mr. Allen L. Legendre, Lead Engineer - Compliance, at (603) 474-9521, extension 2373.

Very truly yours,

Ted C. Feigenbaum

TCF:WJT/act

Enclosures: NRC Forms 366, 366A

New Hampshire Yankee Division of Public Service Company of New Hampshire
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United States Nuclear Regulatory Commission July 26, 1991
Attention: Document Control Desk Page two

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